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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOOSE-LEAF FIELD NOTEBOOK

9-137

K.M. Waage

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Georges Creek Basin — Project 818 logs.

Holes 12 GC to 22 GC inclusive.

K.M. Waagé, U.S.G.S.

Field notes, Ntbk. #3, Maryland Fire Clays

Drill Hole data, U.S.B.M. Proj. 818, Georges Creek Basin.

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*Analysis available.

Hole 12GC.

0 to 20	Surficial
35	Med. gr. ss
36	No Recovery
44	Poor " (1'6") includes 1' of limestone and 6" soft clay with limestone fragments.
45	Carbonaceous shale and clay
47-3	Coal — Lower Bakerstown
49-4	Dark gray plastic clay
60-10	Claystone minor pyrite
91-7	Clayey shale with irreg. bedded siltstone & ss.
93-3	Fine to med ss, mottled, clayey matrix
97-8	Greenish shaly siltstone.
105-9	Claystone & silty claystone gray to greenish, with faint dark red streak 98-5 to 99-3
113	Gradation clay-siltstone-fine ss, green to gray
145	Medium gr. ss
151-8	Gray claystone & silty claystone (Rec. 28")
156-6	Siltstone minor shaly zones
157-6	Limestone & limey claystone
160-4	Fine gr. ss, minor siltstone.
179-5	Silty claystone, sandy at top.
182-2	Claystone
195	Silty green-gray claystone, siltstone at top
199-10	Fine to med ss gray and greenish
202-3	Shaly, clayey siltstone, green
202-11	Dark purple claystone
207-7	Ssand fragmental claystone in ss matrix
234	Silty green & gray claystone, streaks fragmental claystone
245-6	Silty sandstone
253-6	Shaly clay, sandy lower part, 1' med. gr ss at base
254-8	Sandy carb. clay
257-1	Coal — Davis
286-6	Dark claystone, locally shaly, to bastard clay alternating with claystone. Some siliceous flint at base

290	Shaly siltstone
327-8	Med. gr. hackled ss.
329	Shaley siltstone
329-4	Coal — or LF
331-4	Carbonaceous shale
339	Clayey siltstone
350-4	Med. to fine ss, gray to white, interbedded shaly siltstone below middle, med. gr. with streaks coarse cgl. in basal 14"
351-7	Coal — M [illegible]
355-5	Clay + claystone, silty at top
405-8	Fine to med. ss, interbedded claystone + dark fine ss in upper half, hackles base. < (poss coal ?)
410-10	Dark siltstone, sandy towards base.
416-3	Coarse ss carb. partings
418-6	Silty claystone and interbedded sandstone
418-10	Coal — Middle K
429-3	Silty claystone and siltstone [Poor Recovery (18'±)
469-6	Fine to med gr ss interbedded dark shaley siltstone in upper half. Coarse, some shaly pellets basal 2 ft. [Upper ½ dark fine gr ss + silt]
476-7	[illegible] clay [illegible] dark to carbonaceous, (show coal about 475-9)
481-6	Soft bastard clay, sandy, [illegible] minor [illegible] top. Silt. (clay[illegible]) at base.
490-4	[illegible] siltstone + fine sandstone
535-3	Fine to med qtzitic ss, minor hackles + carb partings [illegible] portion
539	Carb shale + shaley gray clay [illegible]
542-8	Coal ([illegible] parting [illegible]) — Savage Gr
545-4	Bastard clay, shaly, carb at top, to clay-siltstone.
550-2	Fine to med. grained ss
574-5 TD	Coarse conglomeratic sandstone, locally qtzitic

Clays – Hole 12 GC

Bolivar 282-10 to 285-4

6" plastic fragmental, finely silty

19" fragmental silty claystone (GC 122)

19' fragmental semi-flint to claystone, pyritic + carbonaceous (GC 123) silty

7" Shaly semiflint, siliceous.

Bastard clay + clay below at 286-6

L.E.-? 476-7 to 480-9

Alternating plastic clays, silty bastard clay minor semihard. Scattered sandstone grains and pockets in upper part, locally pyritic. quite carbonaceous.

Fragmental claystone – (207-7 to 234 at base of interval) (GC-121)

Hole **13GC** (Bloomington)

0 - 26	Surface soil
- 29	Interbedded siltstone + fine ss.
39-10	Shale + silty shale
45-2	Interbedded shale + shaley sandstone
47-6	Sandy [illegible] clay, minor pyrite
47-8	Coal — FH
65	[Poor rec 47-8 to 65 = 7'] Coaly streak in middle. Clay shale & [illegible] calcareous clay limey pellets. [illegible]
66	Shaly clay — [Poor rec. in 65 to 88 interval = 10' ± Loss in shaley clay? Should be to 76?]
80	Siltstone
83	Fine ss
88	Siltstone + shaly siltstone
100	Poor rec = 3'2 Shale with 6" fossiliferous limestone at base.
104	Siltstone sandy at base.
108-3	Fine to [illegible] grained [illegible]
118	[illegible] 3'6 [illegible] 54 to 118-2 [illegible]
118-10	Coal — H
130	Argillaceous limestone
140-9	Limey claystone [illegible] to clay with [illegible] pellets.
143	[illegible] claystone
147	Silty clay, claystone at base
149-[illegible]	Fine ss. quartzitic ←
156	Silt [illegible] clay
159	Kaolinitic clay
166-[illegible]	Greenish white claystone
170-6	Silty clay to siltstone
172	Fine sandstone
184	Silty claystone sandy at base
192-6	Shaly siltstone clayey at top
193-4	Coal [illegible]
208-8	Silty shale
210	Carb shale
211	Coal

(☆) Another observation [illegible] of missing q at 24a.
(compare with hole 18
+
17)

214-3	Carb. clay grading to fine SS
220-8	Interbedded shales and fine sandstone, carb partings.
221-2	Coal
222-10	Shale, carb at base, ostracods at base.
225-8	Limestone and coaly limestone.
242	Interbedded limestone, shale, and clay (A)
272	[illegible] clay, [illegible], clayey siltstone, [illegible] limestone at 264
279	Silty shale interbedded sandstone.
285	Fine ss, shale partings
289-2	Silty clay shale grading to silty clay.
292	Red silty clay
293	Gray " "
324	Fine to med SS
334	[illegible] shaly clay, [illegible] at base, coaly streaks at base.
349-6	[illegible] silty shaly clay and claystone with [illegible] pellets.
426	Interbedded siltstone and fine SS, [illegible] at base
449-6	Fine to medium SS
449-10	Coal — Davis
461	Silty clay and claystone, carb at top.
479	Interbedded siltstone and sandstone
509-7	Med. grained laminated sandstone, quartzitic towards base. (5)
510-3	Coal ~~[illegible]~~ L. Frey? or [illegible]
515-5	Gray [illegible] clay
516-6	Coal " " 2 [illegible]
517-4	Silty [illegible] clay
529-4	Fine [illegible] sand 4'
534	Med. grained sandstone, shale partings
556	Coarse conglomeratic sandstone [illegible]
652-7	Med grained ss, various types, some [illegible], cross lamination, shale partings, zone of pyrite inclusions 593-595'8' [illegible]

652-8	Bony coal
664-10	Coarse sandstone, conglomerate at top, [illegible].
671-5	Silty carb. shale
671-6	Bony coal
680	Claystone grading to siltstone.
690-4	Interbedded fine sandstone and siltstone
707-7	Fine to medium ss, coarse at base, [illegible].
715-3	Dark siltstone fine ss at base.
725	Dark silty shale
727-1	Coal
728-6	Dark clay shale
729-9	Coal
738-9	Carb. shaly siltstone
740-9	Med. grained quartzitic sandstone.
747	Conglomerate

T.D. 747

Clays

510-3 to 515-5. Analytical Sample #20	Slightly silty [illegible] clay, dark gray, [illegible] plastic to semiplastic, small ironstone [illegible]. (GC-132)
346 to [illegible] Analytical Sample #19	[illegible] gray soft + [illegible] [illegible] clay. Stained on [illegible] (GC-131)

Hole 14 GC

0 to 16-3	Surficial
20-8	Shale
27-3	Dark claystone
29-5	Opening and [illegible] ⟨ Barton seam ⟩
49-9	Calcareous claystone grading to clay with calcareous pellets (Poor Recovery)
61	Silty claystone grading to clayey siltstone
67	Med. grained SS.
82-2	Silty clay-shale, sandy streaks toward base, dark shale + coal 2'6"
82-10	COAL — [illegible]
86-2	Bastard clay
94	Silty claystone calc. pellets grading to clayey siltstone streaks fine SS.
107-3	Bastard clay and claystone, [illegible] calcareous
117	Interbedded siltstone and fine sandstone, argillaceous at base
130	Shale, silty at top
130-6	Fossiliferous limestone
136	Shale, fossiliferous in lower part, 3' fossiliferous limestone at base
148	Silty shale, sandy at base. [illegible] plant remains
154	Silty claystone
161	Silty shale coaly streaks at base.
162-4	Coal — Harlem
176-6	Silty claystone + silty clay
188	Interbedded silty claystone and siltstone calcareous at top.
202	Med. gr. SS fine at top.
213	Silty bastard clay and claystone
214-6	Red bastard clay
243	Silty clay + silty claystone, locally shaley
250-7	Dark silty shale
253-8	Coal — [illegible]
256-7	Dark silty shale
260-8	Dark silty claystone
262-1	Coal.

2

268-1 Poor recovery, 25' limestone, silty at base.
278 Claystone, zones of calc. claystone or limestone
290-7 Siltstone to dark finely silty claystone
293-7 Coal — Lb
300-6 Semiplastic clay grading to light gray fragmental, silty zones.
319 Shaly siltstone and silty shale.
320-6 Shaly dark bastard clay
330-6 Silty greenish clay and claystone
336 Siltstone
353-3 Fine to medium sandstone
359-4 Clay and silty claystone
381 Fine to medium sandstone
397-8 Black fossiliferous shale
398-5 Coal — Brush Creek
405 Siltstone
412 Clay shale and bastard clay
465 Greenish silty claystone and shaly siltstone
Zones of fragmental claystone —
436-10 to 438 Fragmental claystone (GC-141)
461-4 to 465- Sand fragmental [illegible] and silty [illegible] (GC-142 + 143)
492 Clayey siltstone grading to siltstone.
521-10 Fine, locally med. sandstone, includes [illegible] sandy claystone 6' from base.
524-8 Coal. Davis
543-7 Argillaceous nodular limestone interbedded with fine dark locally calcareous siltstone (dense [illegible])
552-3 Fragmental silty claystone (GC-144)
587-9 Silty claystone to siltstone sandy [illegible] in lower part.
597-8 Silty claystone local sandy streaks and clayey zones.
603-8 Interbedded siltstone and fine sandstone.
609-2 Dark to carb. shale
611-2 Coal
615 Interbedded silty claystone with limey pebbles and argillaceous limestone.

625	Silty claystone minor sandy streaks
631	Interbedded siltstone and fine sandstone
656	Fine to medium sandstone, numerous zones shaly siltstone
674-1	Medium sandstone, crackled and quartzitic at base.
676-2	Coal
676-8	Coaly carb. shale.
689-9	Interbedded dark shaly siltstone and lignit[illegible] (Coal in this interval 682-1 to 682-5) worthington
697	Dark shale
700-1	Silty claystone
702	COAL
706-2	Silty carb. clay coaly streaks
708-9	COAL
713-8	Silty clay and claystone grading to clay shale
715	Interbedded sandstone and siltstone.
718-7	Silty clay shale and siltstone
730-5	Silty clay and [illegible] clay XXXXXXX
743-3	Interbedded [illegible] siltstone and fine sandstone
743-5	Bony coal
746	Dark clay shale
752	Silty claystone
753	COAL and shale
766-4	Silty claystone to dark silty clay shale.
768-8	COAL
770	Fine dark sandstone
775	Interlaminated siltstone fine sandstone & shale
781-5	Dark gray to black shale.
781-6	Bony coal.
787	Light silty claystone, siderite pellets.
795	Silty gray shale plant frags.
801	Interbedded siltstone and sandstone, dark

T.D.
801

Lower Kitt.

[illegible] – Clay was encountered in run between 715 and 743-3. Core loss this run: 6-1.

Actual recovery.
(From 715).

3'7" Dark silty clay shale, streaks [illegible] in upper part, basal 10" carb. shale.

3'3" Light gray silty soft clay grading to silty claystone, some zones with small [illegible].

7" Gray silty claystone to silty (very finely gray flint) Gradation – claystone to flint.

2'6" Flint clay zone.
[illegible] gray, [illegible] with numerous zones of siderite granules:–
Analytical sample # 21, and (GC-145, GC-146*)
(6" brown [illegible] flint. remainder is flint with many blotches and zones of siderite granules.)

11" Siltstone, brown to gray, clayey.

10" [illegible] carb. clay.

2'4" Silty gray clay becoming more argillaceous siltstone to gray [illegible] silty claystone.

8" [illegible] in siltstone coaly streaks at top.

9" [illegible] flint clay and clay [illegible] mixed. (GC-147)

7" Dark gray sandstone (Barite-and-calcite "veinlets" in it.)

6'2" Interbedded gray siltstone and fine sandstone. Fe speckles in silty layers.

22'2"
(To 743-3)

* With concentrated siderite

Hole 15.

0 to 31	Surficial
42	Poor recovery (2'9") Silty claystone + siltstone.
52	" " (4'9") Siltstone.
68-7	Silty shale, sandstone streaks.
74-8	Dark shale, pyritic dark clay in lower 1'.
74-11	Coal Barton
79	Gray clay shale, limey streaks.
83	Argillaceous limestone.
105	Silty clay + claystone, limey zones + nodules
126	Shale, silty in upper part.
127-6	Coal Fed. Hill.
150	Silty bastard clay, limey pellets, thin ls. zones.
164	Interbedded fine SS + silty claystone
170	Shaley siltstone
203	Dark shales, fossiliferous from 176 to 203
204	Coal Harlem
222	Limey bastard clay, limestone nodules
268	Silty bastard clay grading to silty shale, 5" coal [illegible]
281-5	Dark shale, silty + sandy in upper part - plants
284	Sandstone
296-3	Dark silty shale, sandy streaks upper 2/3.
300	Coal Upper Bakerstown.
314	Dark bastard clay and calcareous claystone with limestone nodules.
320	Siltstone and silty claystone
330	Fine to medium SS, pellet zones.
336	Shale and bastard clay, limestone with ostracods 331-3 to 332
338-2	Coal Lower Bakerstown.
349	Black shale, plants upper half, lingulas lower 1/2.
356	Limey bastard clay, minor fragmental flint clay.
372	Greenish variegated silty clay, claystone and sandstone, minor red shale at base
378	Gray silty bastard clay
395	Interbedded greenish silty claystone and siltstone.
416-7	Interbedded sandstone + silty siltstone
421	Fine SS

424-2	Dark shale coaly streaks
435	Siltstone + interbedded sandstone, [illegible] cross bedded. 1' carb silty clay at top.
449	Fine to medium sandstone.
467	Medium to coarse, conglomeratic top + bottom. inclusion zone at base. Sulfide
473-8	Argillaceous siltstone
475	Dark gray silty [illegible] clay
493	Siltstone, locally sandy.
495	Gray silty clay
502	Red silty clay green mottling
508	Silty claystone, locally laminated (GC-151)
524	Siltstone grading in ss [illegible]
576-6	Medium sandstone
577	Sandy to silty shale.
578-11	Coal — Davis
590	Dark gray claystone - silty claystone, calcareous pellets scattered throughout.
614	Silty claystone, calcareous, arenaceous in [illegible].
624-4	Gray siltstone, with clay [illegible] at base.
631	Fine grained [illegible] sandstone
641	Arenaceous siltstone
655	Siltstone, silty claystone, [illegible] interbedded. sandy at top
665-6	Fine to medium sandstone.
670-3	Dark to carb shale
670-6	Coaly shale.
680-2	Interlaminated fine ss + siltstone.
683-2	Dark shale, silty
684-3	Coal + partings
684-7	Dark silty shale
687-6	Argillaceous limestone
696-8	Siltstone and silty claystone
701-2	Gray to dark gray shale interbedded sandstone
705-2	Carb shale
706-1	Coal
707-4	Coaly shale, pyritic

722	Silty shale, sandy at top.
732	Fine sandstone shaley partings
745	Dark to carb. shale sandy at top
747	Semihard fragmental clay, ironstone concretion at base
751-8	Silty claystone grading to fine sandstone
754	Dark shale sandy at top.
755-6	Dark silty claystone.
755-7	Coal
762	Silty claystone (dark) to siltstone, sandy at base.
783	Interbedded to interlaminated fine sandstone and siltstone, fragmental zone at base.
815	Medium to coarse qtzitic sandstones zones of conglomerate
829	Siltstone grading to fine sandstone.
831	Carb. siltstone, coaly streaks
835-7	Dark siltstone
853	Fine to med. grained sandstone interlaminated siltstones top and bottom.
856-4	Claystone, carb clay at base
856-7	Bone.
863	Claystone and siltstone siderite pellets in basal two feet
875	Dark shale, [illegible] in upper part, silty at base
878-1	Carb. clay and silty claystone, siderite conc.
878-7	Coal and bone.
885-4	Silty bastard clay and claystone
897.	Silty claystone and fine sandstone, dark grey.

Clays: #1 745 to 746-2 : Dark gray semi-hard fragmental, fine silty (GC-152), Analytical - #22

746-2 to 747 : Fe stone concretion

#2 (GC-151) See hole log.

#3 249 to 356 [Thomas clay]

349 to 356 Limey bastard clay grading to bastard clay

354-6 to 355 Bastard clay becoming hard, no obvious lime content

355 to 356 Semi-hard to hard clay, fragmental. (GC-153),

Analytical sample #23 = 354-6 to 356

Hole 17 G C.

0 – 27	Surficial material
42-6	Fine grained cross-laminated ss.
52-6	Gray to carbonaceous, pyritic shale, sandy at top.
53-2	Coal — <u>Harlem</u>
54-2	Calcareous bastard clay, lime pellets
76	Interbedded argillaceous limestone and calcareous claystone with lime pellets
79	Bastard clay, lime pellets.
86	Mottled red and green bastard clay, lime pellets
98	Gray bastard clay lime pellets
121	Interbedded silty claystone and siltstone. Minor sandy zones in upper part. Calcareous stringers and [illegible] [illegible].
138	Interbedded siltstone and fine sandstone
140-6	Fine sandstone, quartzitic at base
144-6	Fissile [illegible] shale
145-2	Coal. <u>[illegible]</u>
151-8	Dark gray shale, plant remains in lower part
153-8	Highly carbonaceous shale, faulted, [illegible] filling in cracks, considerable pyrite.
158	Carbonaceous to light gray argillaceous limestone
175	Interbedded bastard clay, [illegible] limestone. Coaly streaks at 157 and [illegible]
186-8	[illegible] shaly siltstone grading to shale
190	Silty bastard clay
196	Silty claystone grading to siltstone.
199-4	Fine sandstone quartzitic at base.
217	Interbedded siltstone and fine sandstone
217-9	Slickensided clay
221-10	Green claystone calcareous stringers.
226	Interbedded fine sandstone and siltstone,
253-6	Fine to medium cross-laminated sandstone
262-2	Siltstone, silty shale, and silty claystone.
263	Dark gray clay
263-5	Coal — <u>[illegible]</u>
27[illegible]	Gray silty claystone [illegible] [illegible], sandy [illegible]
286	Argillaceous limestone

17-1 (175 interval [illegible] clay [illegible] coal [illegible]
other [illegible] lower [illegible])

17-2 299 [illegible], [illegible]

17-3 [illegible] from [illegible] 313 [illegible]

17-4 (3[illegible] - 3[illegible]) [illegible]

17-5 ([illegible])

294	Green bentonite clay, lime pellets, grading to claystone with calcareous stringers.
296	Greenish siltstone and fine SS, minor fragments claystone.
299-8	Fragmental claystone.
308-6	Interbedded green siltstone and fine sandstone grading to claystone.
A) 315-3	Fragmental claystone
328	Mottled red and green claystone
362	Interbedded siltstone and silty claystone, [illegible] at base.
363-1	Coal
365	Dark claystone, scattered sand grains
365-8	Coal
376-6	Dark claystone, pyritic bentonite clay at top
376-11	Coal
387	Dark claystone, limy pellets at base
395	Light gray clay, lime skin on partings
412	Interbedded fine sandstone + sandy siltstone
464-6	Fine to medium sandstone, [illegible] in lower [illegible].
469-6	Hard silty shale, sandy streaks in lower part.
470-10	COAL [illegible]
A) 473-10	Dark [illegible] clay grading to gray [illegible] clay interbedded silty + sandy claystone and fine sandstones, latter [illegible].
494	
540-3	Red stained X-laminated sandstone, [illegible] with [illegible].
544-8	Shaly SS with 2" pyritic carb shale at base.
545-8	COAL
552-8	Pyritic shaly sandstone, coaly streaks, 1/4" coal at base
555	[illegible] and pyritic [illegible] concretions
559	Clay [illegible]
580-10	Med to coarse sandstone, locally quartzitic, [illegible]
* 581-2	Gray clay

582	Coarse sandstone
588-3	Dark silty and sandy shale + claystone, coaly shale at base and ½' streak boney coal at 585-7
591	Med. grained sandstone
604	Fine grained x-laminated sandstone.
620	Poor recovery. Haver clay, flint, pt. [illegible] silty coal, claystone, Fe stone, and siltstone (12' core loss in interval)
630'	Cgl ss
645	Med. grained SS
652	Dark siltstone coaly streak in mid. part
663	Cgl SS x-bedded
67[illegible]	Coarse Cgl.

Hole 17 G.C. – Clay samples.

Analysis
25

391 to 395. Light gray plastic clay underlying calcareous bastard clay. No apparent inclusion of limestone but some cracks show limey fillings.
(Analysis #25
(Spec. (GC 171)

Other:- (1) Interval ending 175 includes some finely silty carbonaceous claystone with coally streaks at 168. Some calcareous film on coaly partings in this claystone. (No specimen)

(2) (GC172) Interval 296 to 299-8:
Fragmental claystone of varying types [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

(3) 308-6 to 315-3 (GC 173-174-175) Fine [illegible] [illegible] [illegible] [illegible] [illegible] and [illegible] [illegible] [illegible] [illegible] mixed ([illegible]) with [illegible] and [illegible], siltstone. Much included Fe occurs as red [illegible], or [illegible] fragments, or as streaks [illegible] between [illegible]. Green [illegible] [illegible]. [illegible] [illegible] [illegible].

(4) 604 to 620. Flint clay seam of unknown grade and thickness penetrated in this run. Run [illegible] [illegible] [illegible] siltstone, flint and minor semihard clay. No sign of bauxite. [illegible] recovery for analyses. Flint (GC 176-177).

Hole 16 G.C.

0 to 23	Surficial material
37-5	Dark sandy shale.
42-6	Gray plastic clay, slightly silty, some lime nodules.
51	Silty gray claystone.
64	Fine grained sandstone
71	Silty shale grading to shaly claystone
71-10	COAL
73	Argillaceous limestone
78	Limey bastard clay
78-9	Coaly shale, minor bone.
108-10	Gray to dark shale, silty to sandy top and base, plant remains scattered thruout.
109-5	COAL
110	Silty carb. claystone
118	Argillaceous limestone
128-4	Green and gray bastard clay and claystone, limey in upper part.
132	Fine grained sandstone, shaly in lower part
147-7	Silty to sandy gray claystone, shaly in lower part limey stringers thruout.
157	Dark gray silty claystone grading to siltstone plant remains in upper part.
184-8	Dark gray siltstone, scattered sandstone zones at top, middle and base. Minor silty claystone.
195	Interbedded dark siltstone and fine sandstone
225	Fine to medium sandstone, shaly zones at top hackled + quartzitic basal 5'.
249-3	Black fossiliferous shale, limey zones.
250-6	COAL
264	Argillaceous limestone
275	Claystone grading to green bastard clay, limey pellets thruout.
277	Finegrained sandstone
282	Green bastard clay, limey pellets
289	Red + mottled red + green silty clay + claystone.
310	Mottled gray and greenish silty to sandy claystone, interbedded sandstone near base.

316	Fine grained shaly sandstone.
338-10	Silty to sandy shale with interbedded and interlaminated sandstone. Coaly streaks at 319-10
341-5½	COAL
343	Argillaceous limestone, minor clayey streaks
356-10	Silty bastard clay grading to claystone, limey pellets in upper half.
360	Argillaceous fine sandstone.
368	Silty claystone
372	Silty shale, sandy in upper part
372-4	COAL
375-2	Sandy claystone with coaly streaks, 6" clay at base.
377-9	COAL
383-7	Dark gray shale
385-4	Fine grained gray sandstone, mottled.
390-10	Dark to coal shales, lingulas at base.
391-4	COAL
394	Silty bastard clay, limey pellets
39[illegible]	Limestone
403-6	Bastard clay [illegible] limey [illegible] + [illegible]
405-3	Fine grained sandstone
411	Silty to sandy greenish bastard clay. limey [illegible]
412	Gray silty clay, shaly at top
4[illegible]	Mottled red + [illegible] silty clay
427-3	Gray + green silty clay + claystone
436	Fine SS, limey in upper 5'.
443-9	Silty claystone + interbedded sandy siltstone + SS.
465-5	Dark gray shale, sandy streaks and limey concretions
466	Coaly shale + bone.
[illegible]4	Dark to coal shale, coaly streaks at 471, coaly streaks [illegible] in basal 6".
504	[illegible]
506-2	Carb. claystone with ironstone concretion.
507-2	COAL.
509-8	Silty claystone

509-8	Limestone
512-8	Bastard clay, limey pellets upper part.
521-7	Sandy claystone + argillaceous sandstone
528-5	Claystone, sandy at base
539-7	Limestone
544-7	Interbedded claystone, sandy claystone, and siltstone, minor sandstone.
547-7	Semihard clay, irony.
559-6	Fine to medium ss.
565	Claystone, sandy at top.
565-4	Blue limestone
571	Semihard clay, fragmental in upper part, limey inclusions.
573-5	Silty claystone
599-8	Interbedded fine to med. ss, siltstone and silty shale.
602-5	Dark shale, 6" pyritic fragmental clay at base
603	COAL
605-3	Pyritic carb. shale.
608-9	Fragmental claystone and interbedded argillaceous limestone. DE
613	Silty claystone
618-8	Limey siltstone interbedded limestone
627	Zone of fragmental claystones with interbedded [illegible]
629-4	Limestone.
637-4	Silty, bastard clay, limey, grading to silty claystone.
650-4	Fine sandstone and sandy [illegible].
659-4	Silty claystone grading to silty shale
665-10	Plastic to semihard clay
690	Sandy claystone grading to shaly sandy siltstone
725-3	Fine to medium sandstone
727-4	COAL
731-6	Argillaceous [illegible], 6" carb. silty clay at top.
733-9	Fragmental claystone, limey at top (C)

740	Irregularly bedded silty + sandy claystone.
748	Silty claystone grading to silty shale.
749	Sandstone
754-1	Dark to carb. shale + claystone, pyrite
756-5	COAL
758	Carb. siltstone
767	Interlaminated sandstone + siltstone
769-1	shale + silty shale, plant remains, coaly streaks at 767-2 and 768-1
786	Interbedded sandstone and siltstone.
787-7	Shale, sandy streak at base
792-9	Hard + semihard clay (16-2)
800	COAL
801-5	Bastard coal, pyrite.
802	Bone + coaly shale,
808-4	Irreg. bedded, mottled fine SS, coaly at base
811-4	Fragmental silty claystone.
812-7	COAL
815-6	Carb. pyritic shale; few coaly + sandy streaks.
816	Fragmental semihard clay (A [illegible])
824-9	Light tan shale, clay grading to claystone
830-7	Interbedded siltstone + fine SS.
838-5	Silty claystone
840	Hard clay + claystone (B [illegible])
844-4	COAL
854	Claystone grading to sandy siltstone.
884	Fine to medm. SS
896-8	Grey siltstone and interbedded SS.
921-3	Med gr. SS.

NR.

Silty claystones unconformably –

1.) Transitional upward into siliceous claystones and thence to claystones. [illegible] hard [illegible] [illegible].

2.) [illegible] below [illegible] cyclical claystones.

Is it that claystones evidence a period of non deposition + erosion?

Why [illegible] + [illegible] [illegible]

What signif. of Fe at this stage [illegible].

What rel. of iron minerals to [illegible] cycles? What is [illegible]

secondary

recent [illegible]

What signif. of fragmental [illegible]

Fe

[illegible]

[illegible]

↓

[illegible]

Clays – Hole 16

(659-4 to 665-10) Mixed seam – carbonaceous to gray bastard clay (GC167), for 4'4, then about 1 foot of hard clay (GC168), silty dark claystone, then grades to claystone (GC169) ~~[illegible]~~

(787-7 to 792-9) Mixed seam –
Dark gray semihard bastard clay to 788-6
Semihard clay and claystone, to 792-9
it includes good ton semihard (GC1610)
but fragmental claystone (GC1611)*
predominates.
Interval 788-6 to 792-9 = Analysis #24

Other :– (544-7 to 547-7) (GC161) A semihard clay with iron fissure fillings, part of odd concentric Fe concretion. Clay structure suggests reworking in soft state.

(605-3 to 608-9) Samples of types of claystone interbedded with limestone. None of clay stones react to dilute HCl. (GC162) This [illegible] is siliceous claystone, [illegible] with [illegible] in [illegible] areas. Probably [illegible] in soft state, shows gypsum on partings. (GC163) Fragmental siliceous claystone in [illegible] of [illegible]. This [illegible] have limestones of interval and is gradational into silty claystone below.

(731-6 to 733-1) [illegible] to [illegible] silty claystone, Fe [illegible] streaks. Evidence of reworking – intercalations of lowest [illegible] which [illegible] contain [illegible] (small, irreg.) of [illegible] [illegible] increase [illegible] in interval.
(GC164)

(815-6 to 816) ([illegible] fragmental flint clay)
Specimen (GC 165) is complete seam.
Grades upward [illegible] contact at base.
(over)

* [illegible]

(836-5 To 840) [illegible] a dirty
dark [illegible] ~~do (...)~~ limestone with
streak of lt. flint clay. (GC-166)
Flint is fragmental — appears about
half way between reworking while soft
and reworking while hard.

([illegible] 511) [illegible] [illegible]
to [illegible] semihard clay with considerable
Fe and minor lime inclusions.
Specimen (GC 1612 / 1612) shows contact of
homogeneous, like in semihard and
overlying fragmental zone.

* [illegible] is at base of fragmental zone & shows
[illegible] [illegible] and/or fractures
filling in [illegible].

18
18-GC.

0 - 35	Surficial material
46	[illegible] [illegible] [illegible] fine, sand, [illegible] [illegible]
58-6	Fine grained [illegible] [illegible] sandstone
63	Med. gr. sandstone
65-6	Siltstone grading to silty dark claystone.
65-11	COAL
76	Limey [illegible] clay, pellets + inclusions of limestone
83	Green [illegible] silty claystone and siltstone, limey stringers.
103	Interbedded siltstone and fine sandstone
117-4	Med. gr. sandstone, coarse in basal 3 feet, some [illegible] and siltstone streaks
121	Pyritic, black to carb. shale.
124	COAL
136	Limey claystone with limestone pellets [illegible] [illegible] clay.
145	Claystone [illegible] [illegible] [illegible]
157	[illegible] sandstone and [illegible], [illegible] [illegible] in upper 4
159	Fine to med. sandstone
159-7	Dark shale with lingula sp. ?
161-6	Bastard clay, grey to green with rust specks
170	Fine grained [illegible] to [illegible] [illegible]
172-9	Med. gr. sandstone
174-9	[illegible] clay, [illegible] [illegible] at base.
176	Bastard clay, limey pellets.
182-6	Limestone, [illegible] [illegible], silty to sandy
183-6	Fine gr. to oolitic limestone, fossiliferous [illegible]
192	[illegible] [illegible] [illegible] upper 4' [illegible].
197-6	Med. gr. sandstone.
200	[illegible], shaly clay, ferruginous streaks [illegible]
209	Limey claystone and shaly clay, scattered fossils, 2' hard claystone at base
221-9	Dark [illegible] scattered fossils, 220 to 221 ? highly [illegible].

229-6	Irregularly bedded sandstone
241	Silty [illegible] shale, plant remains
341-9	COAL
260	Bastard clay [illegible], pellets
270	Silty to sandy claystone, limey stringers
289	Mottled [illegible] silty claystone, limey stringers + pellets
303	Siltstone grading to fine sandstone
313	Interbedded siltstone and fine sandstone
344	Med. gr. SS,
347-6	Pyritic [illegible] to carb. shale
341-2	COAL
350-6	Limestone, [illegible]
366	[illegible] [illegible], bony shale ([illegible] [illegible]) + clay (maximum 3 x) ?
366-10	[illegible] carb. shale.
368-1	COAL
372	Bastard clay limey pellets
381	Siltstone + silty claystone, [illegible] [illegible] clay at top.
392	Clay to green [illegible] clay, [illegible]
394-6	Fine SS.
394-9	Hard clay
410-9	[illegible] siltstone + sandstone, [illegible] [illegible]
411-9	Sandy clay, [illegible]
412	Green silty clay + claystone, [illegible] [illegible]
462	Sandstone fine to med.
474	Claystone, sandy to shaley, [illegible], [illegible] in lower 2'.
[illegible]	[illegible]
509	Siltstone and silty claystone
511	[illegible]
512	[illegible] + clay pyrite
512-2	COAL
532	Sandy clay grading to sandy claystone,

-845

596 To 599-9

596 to 596-10 - Dark gray irony (sid? [illegible], selenite) claystone grading to [illegible] light gray siliceous fragmental hard clay

596-10 to 598-5 - Fragmental gray [illegible] siliceous in upper 6', slightly siliceous [illegible] in [illegible] pyritic zone (GC 181) - Top of seam (GC 182) center seam.

(analyses # 28)

598-5 to 599-9 - [illegible] to soapy semihard green gray clay locally pyritic. Zone Fe conc. at top. [illegible] in sample.) (GC 183 - semihard near [illegible])

(analyses # 29)

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616 To 617-5

Shaly, soapy gray semihard with 2"± of [illegible] at base.

(GC 184 - basal 3' of this seam)

64-6 to 64? - Semihard fragmental clay -

(GC 185 - top

(GC 186 - Base 5' of upper [illegible]', [illegible] siliceous with [illegible].

551-6 [illegible], [illegible] + fine SS [illegible]
555 [illegible] [illegible] [illegible] conglomerate
in [illegible]
560 [illegible], [illegible]
581-6 Silty claystone & [illegible], [illegible] with
[illegible] at [illegible]
582-2 Carb clay
584-9 Bone, coal streaks. DAVIS
588-6 Sandy [illegible].
591 Shaly siltstone
592 [illegible] [illegible] clay * [illegible]
596 Silty [illegible] claystone, [illegible] pellets in
basal part.
597-9 [illegible] clay.
599-9 Mottled gray [illegible] clay * [illegible]
4 [illegible] silty clay [illegible]
[611 marker] [illegible]
[illegible] [illegible] shaley claystone [illegible] fossil [illegible]
617-5 Sandy [illegible] + blue [illegible] clay
629-5 [illegible] shaley siltstone + fine SS with
[illegible]
[illegible] Carb shale, [illegible]
630-5 [illegible]
[illegible]1-9 Coal [illegible]
641-6 [illegible], [illegible], carb. at
top
645 [illegible] fragmental [illegible]
ironstone conc. [illegible]
648 [illegible] siltstone + claystone
657 [illegible] shale and [illegible]
[illegible] [illegible] to carb shale, sandy streaks
[illegible]65-2 Coal [illegible]
[illegible] [illegible] clay [illegible]
670 [illegible] [illegible] clay
[illegible] at base.
[illegible]71 [illegible] gr. SS, clay partings

810 to 811 — Sediment is fragmented hard clay with bands of ironstone. Minor pyrite

GC 187 — Base showing contact with underlying lithology.

700 Grey shaly, silty and sandy claystone
Some shale [illegible] + sandstone streaks,
Fe stain [illegible]
705-6 Silty shale. Sandy at top, [illegible]
707 Med. gr. SS.
709 Coal
712 [illegible] clay, (Fe [illegible])
714-6 [illegible]
714-10 Quartzitic SS.
715-2 Silty shale
715-3 Coal + bone
715-4 [illegible] clay
724 Bastard clay, [illegible]
[illegible], sandy at top
728 [illegible] sandstone + siltstone.
754 Fine to med. gr. gray [illegible] SS.
+ [illegible]
757 Coarse [illegible] SS [illegible]
761 [illegible] SS [illegible]
[illegible]
771 ? [illegible] [illegible], [illegible]
[illegible]
772 Gray shale
773-4 [illegible]
775-4 Fine gr. [illegible] SS
781-4 [illegible] to sandy shale
805 Fine to med. gr. [illegible]
[illegible]
[illegible]
[illegible] clay
814 [illegible]
815 [illegible] shale, coal at base
820-2 [illegible] claystone
820-4 Sandy shale
821 Silty [illegible]
822-4 Coal
822 Silty claystone

[illegible]

[illegible]

831-[illegible] F[illegible]

[illegible]

[illegible] clay Coal a Bone From 836-2 to 836-10

[illegible]

[illegible]

Hole-19

0 ÷ 18-8	Surficial material
23-10	Siltstone grading to silty gray [illegible] silty claystone, (containing [illegible])
28-6	Gray to black silty clay, [illegible] at base
38-6	Black silty to sandy shale, [illegible] sandstone near [illegible]. ([illegible] upper part)
38-9	COAL
39-9	Silty clay shale and [illegible] clay
44-6	Calcareous clay & claystone, limestone pebbles
53	Silty claystone and clayey siltstone, [illegible]
67	Interbedded siltstone & siliceous claystone, silty clay at top.
79	[illegible] shaly siltstone and fine sandstone.
86	Silty shale and [illegible] shaly siltstone
92	Silty to sandy shaly claystone, [illegible] fine ss at base
105-8	Fine to med. ss.
106-1	COAL
115	[illegible] silty clay [illegible] limestone [illegible] ([illegible] ↓)
121	Silty clay
130	Silty to sandy shaly claystone, [illegible] fine sandstone near base
143	Fine ss., [illegible] siltstone
151	Interlaminated [illegible] and [illegible] shale.
187-10	Dark gray to black [illegible], [illegible]
212	[illegible] grading to [illegible] claystone with limestone pebbles
215	Silty clay [illegible]
224-6	Interbedded siltstone, [illegible] and fine sandstone
226	Limestone
233-6	[illegible]
242	[illegible], 2' [illegible] calc. claystone [illegible]

top.

245. Gray and black silty clay + claystone

257 Interbedded green shaly siltstone + sandstone

263 Med. gr. sandstone

272 Gray to black shale, plant remains

275 COAL

277 [illegible] + limey claystone with limestone [illegible]

285 Silty clay and claystone, lime [illegible] throughout.

300 Silty shale, sandy streaks, (1" lo. [illegible] base)

302-1 Dark to [illegible] clay

303-1 COAL

307-7 Dark [illegible] clay, limestone pellets

313-4 COAL

317-3 Dark silty [illegible] claystone [illegible] limey claystone

332 [illegible] clay, claystone and [illegible] [illegible]

335 Gray [illegible] clay, [illegible]

339 [illegible]

345 [illegible]

347 Shaly sandstone, [illegible]

354 Interbedded [illegible] siltstone, [illegible]

367-6 Silty clay, [illegible]. Gray, red [illegible]. Red 357-359 and 364-366. ☆

371-6 Sandstone [illegible] + claystone, red [illegible], [illegible]

381 Sandy limestone grading to limey SS.

401 Gray clay shale, silty [illegible]

430-5 Dark [illegible] shale, fossil [illegible] in lower [illegible]

431-5 Coal Brush Cr.

437-5 Silty claystone [illegible], [illegible] clay (Hard clay is dirty, worthless stuff)

21

443-6	Siliceous [illegible] & shaly [illegible], 1' SS at top.
450	Gr. to dark gray siltstone, sandy at top.
452-4	Semi-hard gray [illegible] grading to silty clay [illegible]
459	Silty clay-shale grading to [illegible]
462	Fine SS.
464	Silty clay shale grading to [illegible] clay.
466	Shaley [illegible] clay.
467-6	Siliceous claystone, [illegible] pebbles
470	[illegible] claystone
472-2	Fragmental [illegible] and clay ✱
491	[illegible] claystone, [illegible] claystone, minor siltstone.
508	Sandstone [illegible] with [illegible] siltstone [illegible]
512	[illegible] shale ← ([illegible])
516-1	Siltstone, grading to [illegible] fragmental claystone.
520-3	Claystone and [illegible] clay. ([illegible])
522	Fragmental silty [illegible] (19-6)'
532	Fine SS,
547	[illegible] claystone & siltstone, [illegible] clay at base.
555	[illegible]
584	Med. gr. SS.
586	Silty claystone, plant remains.
587-2	Gray clay.
607-2	Interbedded siltstone & [illegible] SS
636-1	Fine to med. SS.
640-4	Coal
641	Silty coaly clay
644-6	[illegible]
650-5	Silty clay & claystone
654	[illegible]
657-3	Silty shale
661-10	Coal.

663-4	Silty to sandy dark shale.
673-4	Fine to med. SS, zones shaly siltstone.
673-6	Dark to carb. shale
694	Dark siltstone & fine SS (735 [illegible] coal)
761	Med. SS. some fine, some [illegible]
771	Dark gray [illegible] and [illegible] siltstone.
802	Med SS, some [illegible]
806	[illegible] clay,
820	Med gr. SS
828	[illegible] siltstone & fine SS,
834	Silty dark shale
837-6	Dark ~~clay~~ claystone & clay
835-11	Coal
840	Med gr. SS (.[illegible])
842	Silty [illegible]
845	Shaly sandstone
876	Med gr. SS, [illegible]
875	[illegible] sandy sh. & SS.

Clays. Hole 19

(367-6 to 371-6) Mottled gray red and green semihard to subplastic clay. Rare streaks of finely fragmental clay. This is the "Meyersdale" red bed of Somerset, etc.

(GC 191) Red clay
(GC 192) Shows fragmental streaks.

analysis # 26 (Total 4' seam)

(2) (470 to 472-2) Fragmental claystone and shaley clay and claystone

7" Fragmental shaly clay and claystone carbonaceous at top (1")
19" Fragmental claystone.
Tan green & gray fragments in uniform light gray matrix. Matrix becomes prominent low inward. Fragments fine & med. to coarse & fine below.

(GC 193) (Upper 7" shaly material)
(GC 194)
(GC 195) } lower 19", top, middle + base.
(GC 196)

[illegible] matrix appears good flint.

analysis #27 (470 to 472)
This is probably Piedmont clay.

(3) (516-1 to 520-3 [illegible] Bolivar—
Details fragmental shaly
9" — Tan silty claystone and silty hard clay with some streaks siltstone. Coarser areas pyritic. (GC 197)

Clays — Hole 19 (cont.)

(3) (cont.)

10" Fragmental gray silty claystone and claystone. Matrix of siltstone (GC 198)

9" Gray locally silty flint clay, fragmental zones and zones silty claystone. Pyrite in coarse areas. (GC 199) and (GC 1910)

22" Fragmental gray to dark gray claystone + silty claystone in siltstone &/or sandy siltstone matrix. Matrix has much Fe. Some fragments term claystone and flinty material. (GC 1911)

(4) 320-3 to 322: Fragmental claystone in green, micaceous, irony siltstone matrix. Little and larger frags. were both soft (?). Spec. shows large inclusion of flinty claystone. (GC 1912)

(5) 233-6 to 235-6. Rather unusual lithology here. Gypsiferous, calcareous, claystone. (GC. 1913)

4

Hole 20

0 [illegible]	Coal burden.
36-5	Fine grained gray to dark gray sandstone, locally shaly [illegible] bedded.
43-6	Coal (Wellersburg)
45	Dark silty claystone
46-6	Calc. claystone grading to argillaceous limestone, with [illegible] fine [illegible].
49-3	[illegible] bastard clay with scattered limestone inclusions.
55 [illegible]	Argillaceous sandstone and siltstone.
61	Fine grained white quartzitic sandstone
62	[illegible] hard (concretionary?) [illegible] limestone and [illegible] clay
64	[illegible] semihard clay ([illegible]).
67 [illegible]	Hard, [illegible], (cryptocrystalline or non-siliceous) limestone. ([illegible], broken by clay streaks at [illegible])
[illegible]	Semihard [illegible] subplastic clay, upper 6" fragmental with limestone inclusions.
79	Silty locally shaly claystone with several 6" ± zones of ironstone.
88-9	Black [illegible] shale, locally has sandstone laminae. Plant remains.
92-8	Coal (Barton)
[illegible]	Silty, [illegible] bastard clay grading [illegible] silty light grey claystone with ironstone inclusions at [illegible]
104-6	Argillaceous siltstone and sandy siltstone
10[illegible]-2	(Interbedded) silty claystone [illegible] shaly siltstone (2" siltstone [illegible] at [illegible])
110	Fragmental semihard siliceous clay. (GC 1201)
112	Silty claystone + siltstone.
121-5	Calcareous zone with interbedded 1) bastard clay with ironstone [illegible], 2) argillaceous limestone 3) calcareous [illegible] with nodules and [illegible]

7

139-8 Thin bedded siltstone and shaly [illegible] sandy near base.
162 Fine grained cross laminated white sandstone with numerous shaly partings, locally quartzitic.
163-[illegible] Coal. (Fed. Hill)
17[illegible] Soft [illegible] slickensided [illegible] throughout.
179 Gray silty clay grading to silty shaly claystone
1[illegible]4 Siltstone and sandy siltstone, argillaceous at top.
195-4 Thin bedded fine sandstone and siltstone grading to interlaminated shaly sandstone and siltstone
203 Sandy dark shale grading to silty shale ([illegible])
221-2 Dark gray to black carboniferous shale ([illegible] concentrated in upper 18")
225-6 Light gray pyritic shale, some [illegible] upper half, scattered plant [illegible] in lower half
229 Dark gray silty shale, carbonaceous near top. Plant [illegible].
239 Thin [illegible] interbedded gray sandstone and siltstone, some [illegible] [illegible] [illegible]
247 Silty shale and siltstone, locally sandy.
248-4 Silty shaly sandstone, [illegible] (Ewalt.)
250-4 Coal. (Harlem)
251 Dark gray silty shale, [illegible] calcareous [illegible].
273-5 Calcareous claystone and [illegible]; [illegible] light gray, [illegible] [illegible] [illegible] [illegible] [illegible] of all shapes + sizes.
282-8 Claystone with scattered [illegible].
286-6 Gray, green and red shaly silty claystone.
291 Interbedded shaly siltstone and fine sandstone

301 Silty gray clay shale with gray streaks and [illegible] in upper part. Red [illegible] streaks near base.
304-8 [illegible] [illegible] [illegible] to sandy clay with streaks sandstone.
307 Med. gr. white sandstone.
312 Gray argillaceous siltstone and fine grained sandstone.
323-6 Fine to medium grained sandstone basal 15" conglomerate.
325 Greenish gray silty shale and siltstone, minor sandstone
336 Med. gr. crossbedded sandstone, coarse zones near base.
339-3 Carbonaceous claystone
343-9 Coal (Upper Bakerstown)
347 Dark to carbonaceous, argillaceous limestone minor limy claystone.
348-6 Claystone and silty clay, limestone inclusions
352-6 Silty claystone, pyritic.
355 Shaly siltstone with fine ss lenses, pyritic
356-8 Gray clay shale.
357 Hard silty carbonaceous claystone.
360 Argillaceous limestone, minor str. dark claystone at top. Fossils [illegible] in lower part.
362 Silty pyritic claystone.
364-6 Argillaceous limestone, strains of semihard clay. (Ls. very hard dense, dark (as above), no fossils.)
365-9 Dark to brown semihard clay.
368-6 Semihard clay limestone inclusions grading to limey claystone, pyritic.
369-9 Bastard clay, coaly zone 369-6.
379-3 Dark gray to black shale, pyritic. [illegible] plant remains
381-3 Coal (Lower Bakerstown - upper split)

Clay 413 to 416-6

A dark grey [illegible] to subplastic clay, silty [illegible]. (At [illegible] Meyerwalde [illegible]) (GC 207)

Analysis #31

389	Dark to black shale silty + pyritic at top, abundant plant remains.
390-4	Coal (Lower Bakerstown - lower split)
391-4	Dark gray pyritic claystone
393	Claystone with limestone inclusions grading to argillaceous limestone
396	A siliceous limestone, dense, hard, dark gray
403-5	Siliceous, pyritic, claystone grading to siliceous clay, limestone pellets throughout.
408-6	Silty to siliceous pyritic claystone.
413	Irregularly bedded clay shale with [illegible] limonitic iron stringers (roughly ‖ bedding). [illegible] at base.
418	Silty to [illegible] red and gray clay (Sample 413-416-6
423-4	Mottled red and green semihard clay and claystone, zone [illegible] pellets (.25 mm [illegible]
432	Fine sandstone and sandy siltstone
441-10	Green silty shale, lower 3' gray, clayey. Small zones [illegible] pellets (.25 mm)
449-10	Calcareous shale, [illegible] silty to finely sandy. Fossil fragments at base.
462-4	Dark gray to black shale, scattered fossils small [illegible] concretions. (Lower 2' plant remains, [illegible] pyritic, no fossils)
463-2	Coal (Brush Cr. rider)
473-6	Fine to [illegible], dark + argillaceous upper 2 feet. [illegible] siltstones [illegible].
505	Gray interbedded siltstone and [illegible] grading to dark silty shale and shaly siltstone. Plant remains throughout.
518	Dark gray to black shale, pyritic, with small calcareous concretions. Fossiliferous. (Lower 2' carrys lingulas only, marine above.)
519	Coal (Brush Cr.
520-6	[illegible], silty, pyritic claystone
527-6	Light gray claystone, limestone zones + nodules

574-9 To 577-9

574-9 To 575-6 [illegible] (GC 202)

575-6 to 576-6 – [illegible] limit. (GC 203 - 204)

576-6 To 577-9 – [illegible] material and [illegible] Te (GC 205 [illegible])

(GC 206 [illegible])

Analyt sample #30
574-9 To 577-9.

[illegible]

[illegible] to [illegible]-3

609 to 612 – Fragmental [illegible] [illegible] material [illegible] (GC 208)

[illegible] to [illegible] Green [illegible] clay [illegible] at top. [illegible] material (GC 209)

[illegible] to 618-6 [illegible], [illegible] and [illegible] fragments.

618-6 to 620-[illegible] Fragmental [illegible] [illegible]. (GC 210)

6[illegible] to [illegible] Fragmental [illegible] layer. Top (GC 211)
Middle (GC 212)
Base (GC 213)

535-2 Interbedded siltstone and fine sandstone.
541 Gray claystone
546 Siltstone and fine sandstone
560-1 Gray claystone and interbedded [illegible] [illegible] silty shale.
560-11 Coal.
565-4 Dark silty claystone, becoming shale downward.
571 Gray shale, silty in upper part, coaly partings at base.
572 Hard dark gray silty claystone.
573-6 Argillaceous limestone.
574-9 Calcareous claystone, limey blebs.
575-6 Fragmental claystone (Large half-ton [illegible] flint clay frags in dark claystone with scattered limey blebs) [see above] (2
577-9 Fragmental claystone and [illegible] flint clay.
578-10 Siltstone
579-6 Fragmental claystone
582-6 Dark gray to black silty [illegible] and siltstone.
584-6 Calcareous claystone and [illegible]
586-9 Argillaceous limestone, [illegible]
587-10 Fragmental shaly claystone, 3" limestone at [illegible].
592 Claystone + silty claystone, shale at base.
599 Interbedded shaly siltstone and fine sandstone
602-9 Silty to sandy claystone
603-[illegible] Shaly claystone, carbonaceous at top
605-4 Fragmental calc. claystone [illegible] 2" [illegible] limestone at base.
609 [illegible] siliceous [illegible], [illegible].
624-3 Fragmental claystone and [illegible]
30' [illegible] (205
4' [illegible] (204
18" [illegible] zone, [illegible] (21[illegible]

[illegible] Silty gray claystone (211 op base + 2 / 212 ... / 13 bed ...)
[illegible] siltstone, silty claystone [illegible])

628-4 Dark gray siltstone.
635 Interbedded siliceous (flinty) claystone, calcareous claystone, and argillaceous limestone. (Red streaks at 630 - probably [illegible])
6[illegible]1 Silty claystone grading to siltstone
642 Siltstone becoming sandy downward
664-[illegible] Med. gr. SS, minor silty inclusions & siltstone.
669-6 Interbedded shaly siltstone and fine sandstone
670-1 Silty shale
671-1 Coal
674-6 Dark gray calcareous claystone and bound clay with limestone inclusions.
677 Light gray siliceous semihard clay with silty streaks, mottled to fragmental
686 Gray argillaceous siltstone grading to shaly siltstone with sandy streaks & laminae.
703 Interbedded fine sandstone and siltstone, [illegible] laminated silty shale in lower 5'.
707-6 Dark gray to black shale and silty shale.
708-9 Coal
711-9 Dark gray silty claystone
719-6 Dark gray silty shale, with sandstone laminae.
721-2 Coal
7[illegible]5-4 Dark gray argillaceous limestone.
730 Gray to [illegible] [illegible] clay and claystone, siliceous with [illegible] inclusions [illegible] upper part and 5' semihard shaly clay at base.
732 Irregularly interbedded siltstone and fine sandstone.
735-6 Shaly claystone and clay shale
738 Argillaceous siltstone.

85[illegible] to 835-5. F[illegible] [illegible]
sity, P[illegible]
T[illegible] (2017 + 2018)

747	Carbonaceous clay shale and shaly claystone
758	Dark gray silty shale
760-10	Fine grained micaceous sandstone
782-2	Gray to black shale and silty shale. Shaly siltstone in upper 5'
785-10 GC(2014)	Carbonaceous similar to semiflint clay with with some gray + brown semiflint clay fragments (latter pisolitic, [illegible]) interbedded with coal shale
786	Coaly clay
786-7	Carbonaceous [illegible] semiflint clay (GC 2015)
787-3	Dark gray to black silty claystone with scattered coarse grains quartz.
790	Tan [illegible] clay; upper 6" dark [illegible] clay. ([illegible]) (Anal 32 - GC 2016)
805	Irregularly interbedded with tan and fine sandstone. (latter increasing [illegible])
816	Fine sandstone, irregular, [illegible], zones and partings of silty shale.
833-6	Fine to medium quartzitic tan sandstone (bedded)
834-6	Carbonaceous pyritic [illegible]
835-5	Fragmental flint clay, upper 3 silty semi-flint
837	Fragmental pyritic and clay, tan, (with [illegible] grains of ? in lower part) (GC 2019)
837-7	Shaly tan semiflint clay
838-7	Ironstone
839	Semiflint clay (finely peppered with bituminous specks.)
840	Carbonaceous silty claystone scattered coarse quartz [illegible] grains.
847-9	Carbonaceous and [illegible] shale
848-9	Fragmental silty semiflint clay
850-9	Coal
850-11	Coaly claystone, scattered quartz grains
852-6	[illegible], white semiflint and dark claystone. ~~([illegible] clay)~~
855	Dark gray siltstone [illegible]

861 Shaly siltstone grading to silty shale
861-6 Carb. shale
865-6 Light tan siliceous claystone grading to siliceous siltstone. About 8" shale [illegible] at top.
874 Light gray hard fine siliceous siltstone with
(GC2020)→ abundant ferruginous (siderite) pellets [illegible].
876-6 Dark gray to carb. shale, scattered Fe pellets in upper 1'.
879-9 Dark gray to black silty claystone.
903-6 Interbedded siltstone and fine sandstone.
946 Fine grained sandstone, locally X-bedded, some [illegible] zones, some [illegible] inclusions, minor fine [illegible] [illegible].
948-4 Dark gray to carb. silty shale
949-3 Carb. claystone
954 Gray argillaceous siltstone (scattered [illegible]) red silty claystone with zones of ferruginous (siderite?) pellets (GC2021)
955-6 Gray sandy siltstone and fine sandstone, [illegible] some Fe [illegible] [illegible].
959 Light to dark gray fine grained sandstone.
966 [No recovery – fragments red silty clay and gray fine grained sandstone.]
971-4 Red silty claystone, some green mottling at base. Some ferruginous [illegible] GC(2022)
980 Silty claystone, red & green, grading then green-gray siltstone to sandy siltstone [illegible].

T.D. 980

Take [illegible] Chase contact at 960
[illegible] contact in 903-6 to 960 inferred.
[illegible] – 133 [illegible]

Hole 21

Fstby 20±
El. 2410±
2420

15 [illegible] of [illegible]

Hole 21.

0 to 22	Overburden.
26	Weathered med. gr. SS., clay partings.
44-6	Fine gr. SS. grading to siltstone with sandy zones.
46-6	Dark gray to black, carb. silty bastard clay.
48-11	Coal
X 56	Soft gray bastard clay.
69	Silty bastard clay and claystone with limestone pellets.
77	Silty gray claystone and siltstone, calcareous stringers and band Fe carbonate (concentric) #1 (GC 211) concretions. Limestone inclusion [illegible].
80-9	Interlaminated fine sandstone and siltstone
92-6	Dark to gray silty shale, shaly siltstone at top. Plant remains [illegible].
94	Laminated fine and med, [illegible] light sandstone
95	Dark shale, plant remains.
97	Interlaminated silty shale and sandstone.
115-10	Dark gray shale
117-6	Coal
125	Silty [illegible] claystone, [illegible] to fine [illegible] to fine siltstone.
136-6	Calcareous fine grained sandstone, silty in upper part. Scattered lime [illegible] in upper 4'.
137-6	Conglomeratic limestone. Quartz pebbles (up to 1/4") in arenaceous limestone matrix. (Carbonaceous) limestone fragments also present.
140	Argillaceous limestone.
143	~~Calcareous~~ claystone and bastard clay, with large slightly calcareous inclusions
149	Interbedded siltstone and silty claystone.
150	Fine grained sandstone
153	Shaly claystone
165	Silty shaly claystone and shaly siltstone

169-9	Interlaminated fine sandstone and siltstone.
171	Silty, shaly claystone.
171-6	Fine sandstone
174	Dark gray to black shale.
174-11	Coal
183	Calcareous mottled clay, argillaceous limestone from 178 to 179
186	Shaly claystone grading to sandy siltstone
190	Fine grained sandstone, [illegible]
207	Interlaminated shaly sandstone and siltstone. Shale increases downward.
211-6	Light gray silty shale, with sandy streaks
225	Dark gray to black shale, fossils [illegible] below 216-6, concentrated in lower 3', dark gray limestone in basal 1'.
232	Gray siltstone, pyritic, becoming sandy at base.
236-6	Interbedded fine sandstone and siltstone.
256-0	Fine, minor medium, sandstone.
257-6	Coal
267-9	Argillaceous limestone (grading to →
273	Calcareous siltstone
275-6	Claystone with limestone pellets.
287	Red clay and claystone, green mottling, lime pellets common.
306	Interbedded green siltstone and silty claystone, limy stringers.
320	Medium grained sandstone.
332-9	Interbedded shaly siltstone and silty shale.
339-10	Dark gray to black shale, silty at top, scattered plant remains
343-3½	Coal.
353	Interbedded claystone and argillaceous limestone, minor siltstone, and shale.
361	Claystone with limestone pellets.
365	Gray siltstone.

[illegible] pt gone

371-3	Silty claystone gray, to black at base.
388-6	Dark gray to black shale, silty at top.
390-2	Coal.
401	Hard dark gray claystone, sandy in upper 1½ feet, calcareous 392 to 393-6
412-6	Gray claystone grading to shaly claystone and siltstone and silty shale [illegible] stringers in upper part.
420	Dark gray silty [illegible] claystone grading to greenish gray with 8" zone [illegible] pellets at 418.
423-5	Siltstone and fine sandstone
424-2	Silty pyritic gray claystone.
425-6	Sandy siltstone.
429	Silty shaly claystone, calcareous stringers + blotches.
432	Fine grained calcareous sandstone.
438-6	Interbedded calcareous sandstone and silty shale.
451	Silty to sandy gray shale, local zones of irregularly bedded fine argillaceous sandstone.
461-6	Dark gray to black shale, fossiliferous in lower 8' (sparingly so [illegible]). Carbonaceous shale lower 2'.
468	Interbedded dark gray to black silty shale + [illegible] laminated and white fine sandstone. 2' gray shale at top.
473	Gray silty claystone and silty shale, minor sandy [illegible] at base. Scattered plant remains.
475-1	Black to carbonaceous shale, plant remains and [illegible] shale at base.
480-4	Gray siltstone, minor silty claystone, ironstone concretion in basal 4". (Plant remains [illegible] 3')
490	Fine grained gray sandstone, some interbedded siltstone.

512-6		Coarse white conglomeratic sandstone.
513-6		Carbonaceous shale pyritized fossils
515		COAL (Brush Creek)
518		Calcareous siltstone
519-[illegible]		Gray [illegible] clay, slightly calcareous
525		Shaly gray siltstone
533		Gray [illegible] clay, calcareous at top, grading to argillaceous siltstone.
535-3		Siltstone and silty claystone
536		Fine sandstone
539		Siltstone
565		Interbedded silty claystone, siltstone and shaly claystone. Calcareous in lower 6' (Limestone [illegible] at base (GC212)
565-6	X	Fragmental [illegible] siliceous [illegible] clay. (GC213
569		Siliceous claystone grading to siltstone
576-6		Interbedded shaly siltstone and fine sandstone. Latter increases downward.
620		Fine to medium sandstone.
620-11		Carbonaceous pyritic clay
626		COAL (Lower [illegible])
629-6		Bastard clay, locally calcareous.
632		Calcareous claystone
647		Silty claystone, minor siltstone, calcareous stringers & locally pellets. (Some fragmental claystone) X
648		Gray clay shale
649		Silty fragmental claystone, calcareous fragments,
654		Silty clay shale, 6" calcareous fragmental claystone at base, with ironstone conc.
664-3		Silty shale with conc., [illegible] and [illegible].
664-8		COAL
669		Gray silty [illegible] clay, slightly calcareous
683		Siltstone [illegible] in [illegible], calcareous at top.
688		Fine sandstone, minor siltstone
690		Dark to carbonaceous shale.

19[illegible]

793 to 793-6 Dark gray [illegible] shaly claystone, some [illegible] [illegible] pyrite

793 6 to 795 Fragmental [illegible] [illegible] [illegible] clay [illegible] pyritic (weathered [illegible] upper [illegible] chipping [illegible] fragments GC217)
+ pyrite [illegible] 3 GC218

795 to 797 [illegible] [illegible] [illegible] [illegible]

([illegible] [illegible] [illegible] [illegible] of [illegible] [illegible]
797-6 to 799-6 ([illegible] t.#)
[illegible] [illegible] [illegible].
upper 6' [illegible] [illegible]
[illegible] to [illegible] GC219

Anal. # 33 → GC 2110

799-6 to 800-2 [illegible] [illegible] [illegible] clay with [illegible] [illegible] fracture planes GC 2111

697	[illegible] with [illegible] sandstone and [illegible] silty shale. [illegible]
699-11	Coal
700-4	Coal [illegible]
703-3	Dark gray silty shale.
710-6	Fine sandstone, [illegible] brown [illegible] 5'.
726-6	Med. grained sandstone
738	[illegible] gray siltstone [illegible] sandstone.
740-3	Carbonaceous [illegible], calcareous [illegible]. [illegible] (Cheh) [illegible]
740-7	Fine [illegible] [illegible] and pyritic
740-9	Coaly shale (1' coal ?)
742-5	Carbonaceous silty shale.
758 (correction 758-7)	Fragmental claystone. [illegible] siltstone + silty claystone [illegible] 751-7. [illegible] 5' [illegible] claystone sandy at base.
761	Shaly siltstone grading to silty gray shale.
781	Dark gray to black shale.
782	Silty pyritic claystone.
785	Dark silty shale.
793	Dark gray [illegible] plant remains.
800	Fragmental claystone, [illegible]. Chiefly [illegible], [illegible]. Pyritic.
802-6	Dark gray [illegible] clay.
804-6	Coaly pyritic shale.
806-6	Dark gray [illegible] claystone grading to siltstone.
808-6	Fine sandstone
829	[illegible], conglomeratic, [illegible] sandstone. [illegible] 2'.
831-8	Light [illegible] gray clay shale
832-11	Coal

832 [illegible]

[illegible] to 835-7 [illegible]

[illegible]

[illegible] 839-6 [illegible]

[illegible] Upper ½ of seam [illegible] in sandstone.

GC (2112 Upper ½

GC 2113 Lower part

Angel (835-7 to 838-9)
#34 ~~([illegible])~~

[illegible] to [illegible]

7[illegible] 74[illegible] [illegible]

[illegible] locality ~~([illegible])~~

[illegible]5 [illegible] 751-

[illegible]

[illegible]

[illegible] to 75[illegible]

[illegible] part [illegible] (GC 2-14)

75[illegible]-6 [illegible] 75[illegible]-7 [illegible]

[illegible] (GC 215)

75[illegible] [illegible] 758 [illegible] (GC 216)

[illegible]

1 ON.

[illegible]

835-11	Silty to sandy, fractured ...
839-6	Sandy... and bedded clay
848-6	Silty ... grading to siltstone
850	... siltstone ... fine sandstone
875	... sandstone zones of shale, ... in upper 5', ...
876	Coaly shale
877-2½	Coal
886	... bedded fine sandstone, some siltstone in upper and lower ...
912	Medium grained ... bedded sandstone
917-3	Gray to carbonaceous shale
965	Chiefly medium grained crosslaminated sandstone, minor fine sandstone. Zones of coaly & shaly inclusions.
966	Carbonaceous to coaly shale.
972	Gray to ... gray ... clay, ... downward - plant fragments
977	Silty claystone - siderite? pellets
985	Silty claystone (... fragments), siltstone at base.
988	Black shale
998	Gray fine grained sandstone, argillaceous with plant fragments in upper 3' - ~~...~~ zones of Fe pellets ... (...)
1014	... fine ... and siltstone, light gray ... grained ... Fe pellets at ...
1023	Gray silty claystone and siltstone ... silty shale and sandy ... (...)
1030	Mottled red and green shale and silty claystone, ... zones Fe pellets

Hole 22 C

0.0 - [illegible] Surficial material.
-55 [illegible] greenish gray shaly siltstone and silty shale with zones of fine sandstone. Ironstone bands
57-4 Gray, silty, clay-shale.
58-1 Coal
63 Soft [illegible] clay
81 Silty clay and clay shale [illegible] to shaly siltstone with zones of fine sandstone. [illegible] silty clay [illegible] [illegible]
84-6
86 Gray, finely silty [illegible]
99 Red and green, silty claystone, minor silty clay.
104-5 Some greenish gray siltstone and silty [illegible] upper 2' [illegible] several [illegible] [illegible]
112-9 Red silty claystone
137-6 Gray and green [illegible] silty clay and [illegible] claystone, [illegible] [illegible] from 113 to 127 (6' [illegible], probably 127 to [illegible])
142 Silty claystone with intercalated thin beds of medium grained sandstone.
150 Clay shale (green gray + [illegible]) [illegible]
160-10 Medium grained sandstone [illegible] with dark Fe pellets. ([illegible])
164-6 Silty [illegible] clay [illegible] ([illegible] 2' [illegible] top)
165-[illegible] [illegible] siltstone and [illegible] claystone
172-6 Silty gray claystone [illegible] clay upper 3' [illegible]
176-6 Silty [illegible] clay [illegible]
187 Siltstone and silty [illegible] grading to fine sandstone [illegible]
210 Medium grained ~~[illegible]~~ sandstone. ([illegible])
212-4 Clay shale [illegible]
218-1 Dark gray to black shale.
221-8 Coal
222-8 Fragmented soft clay
226-4 Silty [illegible] clay, pyritic in lower part, [illegible]

2?0	Silty [illegible] clay grading to siltstone.
270	Fine to medium grained highly micaceous sandstone
271-6	Shaly [illegible] silty clay
271-10	Carb. shale, minor coal & bone.
274	[illegible] gray to [illegible] claystone, pyritic
280-1	Gray shale, silty, interlaminated fine sandstone in upper part.
286	Coal.
286-6	Black silty clayey shale
289	[illegible] limestone.
295	[illegible] claystone and siltstone with stringers and [illegible] of limestone and ironstone.
297	Gray clay shale, limestone & ironstone inclusions
303-6	[illegible] bedded [illegible] sandstone and siltstone
311	Gray to dark gray clay shale, ironstone locally.
311-8	Fragmental sand clay (Bolivar or LF)
323-4	Silty [illegible] clay grading to silty claystone
330	Soft to semi hard clay, locally silty and shaly.
337	Silty claystone.
337-6	[illegible] claystone
338-1	Bone, minor coal
341-6	Dark gray silty claystone
344-6	Fine sandstone, [illegible] dark [illegible]
357-1	[illegible]
359-11	Coal
360-6	Gray shale
362-6	[illegible] limestone and limey claystone
371-10	Silty claystone
376-6	Silty shale and shaly siltstone, clayey [illegible] at top and base.
380	Silty claystone
384-6	Interbedded siltstone and fine sandstone.
388	Silty shaley claystone, 8" fine sandstone at base
392	[illegible]
392-1	Coal
397	Interbedded silty claystone, siltstone, and sandstone

399-5	Black shale, clay & claystone.
401-9	Coal
406-5	Silty claystone, locally shaly
413-3	Interbedded siltstone and fine sandstone
416	Coal.
*425	Fragmental semihard and plastic clay. Ironstone concretions.
440	Shaly claystone grading to silty dark shale with sandy streaks.
456-3	Silty claystone grading to siltstone (basal 4' is [illegible] natural cgl.).
457-3	Coaly pyritic shale
462	Fine quartzitic sandstone shaly zones and laminae.
470-6	Dark gray shale, sandy streaks in upper part, 6" carbonaceous shale at base.
471	Carbonaceous silty clay
476-6	Irregularly bedded siltstone and silty claystone sandstone stringers and [illegible].
507	Fine grained sandstone, quartzitic, [illegible].
509-6	Interbedded fine sandstone and siltstone
515	Fine grained quartzitic sandstone
544-6	Medium to coarse, conglomeratic sandstone, [illegible]
545-6	Sandy siltstone
547-6	Interlaminated light & dark [illegible]
563	Dark gray to black shale
568	Fine and medium grained sandstone carbonaceous streaks and partings
569-6	Silty claystone with ironstone concretions
571	Siltstone
579	Fine sandstone
579-3	Carb shale coaly streaks
581	Dark gray silty claystone, coal streaks at base
584-10	Dark shale, boney coal 583-4 to 583-6.
588	Siltstone, sandy zones at base
594-8	Fine sandstone
595-6	Bone and carb clay
596	Siltstone

598-4	Irregularly bedded fine sandstone
600	Dark to carbonaceous claystone coaly streaks in upper foot.
607-4	Finely silty tan claystone
610-4	Dark gray silty claystone
611-5	Dark gray to black shale, sandy streaks.
612	<u>Boney coal</u>
613-8	Irregularly interbedded dark claystone and fine sandstone.
638-7	Fine to medium grained sandstone
652	Black, locally silty, shale.
660-7	Silty claystone grading to argillaceous siltstone
667	Interbedded siltstone & fine sandstone
668-9	Silty gray shale.
679-9	Irregularly bedded sandy siltstone and fine sandstone
679-11	<u>Boney coal</u>
686	Sandy siltstone and siltstone.
692	Interbedded siltstone and fine sandstone
734-6	Medium and coarse grained sandstone
736-6	Silty claystone & siltstone.
755	Interbedded silty shale and siltstone, dark gray to black. 2' silty tan claystone at base.
817-6	Medium and coarse sandstone, zones of conglomerate, irregularly crossed with numerous partings
836	Interbedded dark gray siltstone and sandstone. [illegible] in lower [illegible].
845	Green gray shaly claystone becoming silty downward.
849-	Green gray siltstone, micaceous (biotite?)
854	Greenish, mottled, [illegible] fragmental claystone and silty claystone. Zones of siltstone in basal part and several zones somewhat fragmental silty clay.
862	Gray to dark gray and black [illegible] shale, plant

remains (reeds)

865-6 Chiefly dark gray siltstone, minor silty shale.

872 Dark gray banded pyritic shale, plant remains

876. Dense gray siltstone sandy zones near base.

877 Coarse sandstone

875 Fine dark gray sandstone

881 Red and green clay shale becomes silty in basal part.

900 Interbedded greenish fine sandstone and sandy siltstone

T. D. 900'

[illegible]

[illegible] Fra[illegible] [illegible] and [illegible] [illegible] dominance, [illegible] [illegible], Gray [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] frequently [illegible] (GC 221)

Basal [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] Gyp[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

313 [illegible] 8 [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] 31[illegible]

[illegible] [illegible] 3[illegible]

[illegible] [illegible] [illegible]

Hole 22 | Clays.

#1
311 to 314-8. (Boxed)) [illegible]
314-8 315-8 About this much fair plastic before it gets silty (not sampled)

#2
323-4. 325-3 light gray Shale [illegible] grading to soft finely [illegible] dark clay shale
325-3 329-9 Soft clay (pl.) upper 2' good plastic, locally fragmental lower 2'6" becoming increasingly silty throughout. Large Fe. stone concretions in [illegible]

#3 416 to 425

416 to 418-6 Grays dark gray [illegible] [illegible] to semiflint clay becoming fragmental at base
418-6 to 425 Fragmental semiflint to semiplast clay. Ironstone concretions. Upper 2½' to 3' chiefly plastic + semiflint.
~~[illegible]~~ [illegible] [illegible] parts) [illegible]

35

(G(327)
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